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DEPARTMENT OF AGRICULTURE.

JAMAICA.

ENTOMOLOGICAL CIRCULAR NO. 11.

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C. C. GOWDEY, B.Sc., F.E.S., F.Z.S..
Government Entomologist, Jamaica.

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The Director of Agriculture

Jamaica,
B.W.I.

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THE SWEET POTATO WEEVIL.

(*Cylas formicarius*, (F.), var. *elegantulus*, Summ.)

By C. C. Gowdey, B.Sc., F.E.S., F.Z.S., Government Entomologist, Jamaica.

Distribution.

The country of origin of the sweet potato weevil is not known, but it originated undoubtedly in the tropics, whence it has spread to the subtropics. It is now recorded as occurring in Northern and Southern Australia, Southern United States of America, Mexico, the West Indies, British Guiana, West and East Africa, Madagascar, Southern India, Ceylon and Cochin-China.

Food Plants.

Though sweet potato appears to be the most favoured food plant of this weevil, losses approximating fifty per cent. of the crop being by no means an unusual occurrence, it is recorded as completing its life-cycle on several other species of the *Convolvulaceae*, for instance, in the morning-glory.

Description.

Egg.—Colour, yellowish-white; shape, broadly oval, narrowed near the base; shell, finely granular, thin, soft. Length, 0.65 mm.; breadth, 0.4 mm.

Larva.—The newly hatched larva is white, legless and measures about 1 mm. in length. The colour of the full grown larva is greyish or dirty white, the dorsum and sides are wrinkled, the entire body is covered with fine pubescence and almost cylindrical in shape, except for the posterior end, which tapers to a blunt point; the head is yellowish brown, narrower that the body and has several long hairs; the legs are represented by tubercles bearing several fine hairs; the abdominal segments are, with the exception of the last two, of about equal length, and bear a few minute hairs on the dorsum and sides. Length, 5-8 mm.

Pupa, Ventral View.—At first the colour of the pupa is white, but gradually changes to yellowish and later becomes darker. It is elongate in shape, tapering to a blunt point posteriorly. The head is deflexed under the thorax, and has several minute tubercles provided with hairs; the eyes are colourless at first, but become darker before the transformation to the adult stage; the antennae and legs are not folded; the abdominal segments are distinct, wrinkled, with two curved, sharp processes towards the apex, and prominent tubercles bearing short hairs on the lateral margins of each segment.

Adult.—Head, black, shiny, smooth; beak, black, curved, stout, about twice the length of the head; antennae, attached at about the

middle of the beak, reddish-brown, last segment provided with short bristles. Prothorax, wider than the head, reddish-brown. Wing covers, wider than the head, dark blue, elongate-oval, convex. Legs, reddish-brown, with femora and tarsi somewhat darker; claws, black. Length, including the beak, 5.5. mm. to 8 mm.

Life-History and Habits.

The eggs are laid in sealed cavities in the tubers or in the stems at a point near or just beneath the surface of the soil. The duration of the egg stage varies from four to seven days, the maximum occurs in December and January, and the minimum in June to September. The number of eggs laid per female ranges from forty to seventy.

When the embryo is nearly fully developed it is apparent through the thin egg shell when it may be seen that the head of the larva is turned away from the fixed end of the egg, but it is at a point near the fixed end of the egg that the larva usually emerges from the shell through an irregular hole which it has gnawed. It begins feeding, gradually burrowing into the tubers or stems as soon as it emerges from the egg-shell, or it may even begin feeding before it has completely emerged. The operation of hatching usually takes several hours.

The larva tunnels in the tubers in all directions, the tunnels often intersecting each other, but on nearing maturity it feeds towards the surface, leaving only a thin skin to cover the pupal cell, at which point the insect emerges later as a weevil. The duration of the larval stage ranges from seventeen to twenty-three days.

Between the larval and pupal stages there is an intermediate stage, known as the pre-pupal stage, varying in duration from one to five days, during which, as in the pupal stage, the insect remains quiet, does no feeding and merely wriggles its abdomen on being disturbed. In this stage the body of the insect becomes shorter, swollen, conspicuously wrinkled, and the legs are represented by slight protuberances or swellings.

As soon as the adult appendages are formed under the larval skin the time for pupation has arrived and a split in the skin appears midway between the eyes and extending to the thorax. The head, with its appendages, and the thorax become exposed and the skin is gradually pushed backwards over the abdomen by twisting movements of the abdomen. Transformation to the pupal stage is then complete. The actual transformation takes about half an hour. The duration of the pupal stage ranges from seven to eleven days.

Just before the insect is ready to transform from the pupa to the adult, or weevil, the wing-covers become darker and the abdomen becomes swollen, less wrinkled and more pointed towards the apex. The insect by twisting around its abdomen bursts the pupal skin on the back of the thorax and the split extends forward so that by more wriggling the head, beak and antennae are freed; the splitting continues backwards and by more wrigglings the legs are freed and then the complete shedding of the pupal skin is quickly accomplished. This transformation takes about an hour.

Several days are spent in the pupal cell before the adult becomes sufficiently hardened to emerge, and even after emergence it is only after feeding for some days that its body attains its normal coloration and hardness.

The weevil feeds on the tuber for preference, but it will also feed on the foliage and stems. When feeding on the foliage and stems t is usually found on the underside. The attack on the aerial portions of the plant causes the plant to have a sickly appearance and if the attack is severe the vine dies off.

The average length of life of the female without access to food is about fourteen days and that of the male about ten days.

Though climatic conditions may be a factor influencing the number of the insects, there are no well defined seasonal broods; in other words, the insects breed throughout the year.

Dissemination.

The spread of this pest takes place in two ways—by artificial and by natural means.

The artificial means of dissemination is the most important as it is the most usual and usually takes place by means of the transportation of infected slips and tubers, and of the latter especially those used for seed purposes.

The usual means of dissemination by natural means is by flight. But, though the wings are well developed and several cases of flight are recorded, the extent of flight of this insect appears to be limited to about fifty feet. The male appears to take to flight more readily than the female.

Protection.

This insect is well protected from its enemies owing to its habits, hardness and colouration. The whole period of the immature stage is spent within its food plant. Moreover, the weevil has the habit when disturbed of 'playing possum,' feigning death and dropping.

Reproduction.

Copulation takes place soon after the sexes have become sexually mature, that is, on the expiration of the feeding period of about four to six days after emergence from the pupal cell, during which period the body of the adult becomes hardened and the sexual organs complete their development. Copulation takes place several times during the life of the adults in spite of the fact that one act of copulation appears to be sufficient to fertilize the usual number of eggs laid by a female.

Control Measures.

The control of this pest is a difficult problem owing to the fact that the greater part of its life-cycle is spent within the food plant, but it is possible to adopt certain agricultural practices and remedial measures which would prove effective in decreasing the loss caused by this insect.

Sanitation.—Before the crop is planted the land should be thoroughly cleaned up; all pieces of tubers and vines should be collected and destroyed or pigs allowed access to the field. The field should then be thoroughly cultivated and the cleaning-up process repeated. As has been stated above, this insect feeds on other *Convolvulaceae,* particularly the morning-glory, so such plants growing in the vicinity of the field should be destroyed.

Traps.—Traps of uninfested tubers should be set in fields which are known to be infested with this weevil before the planting is begun. These traps should be partially buried. They should be examined daily and the weevils destroyed. After the traps have been in use for about a week or so they should be burnt or fed to pigs so as to destroy any eggs which may have been deposited in them.

Method of Planting.—In fields situated within the area in which this pest is known to occur, the crop should be planted on the level and not by the 'hill' system. In such areas, too, it is advisable to plant a deep-tuber variety of sweet potato.

Clean 'Seeds'.—As the most usual way in which this pest is disseminated is by means of infested slips and tubers, it is important that these should be carefully examined before being planted and that all rejected 'seeds' should be scrupulously destroyed or fed to pigs.

Cultivation.—Since the weevils may reach the tubers by way of crevices, which often occur in heavy soils during drought, it is advisable that the fields should be given light cultivation at frequent intervals until the covering of the surface by the vines makes this course impossible.

Harvesting.—By harvesting the crop as soon as it matures, the loss caused by this insect may be greatly reduced. The badly infested, and therefore useless, tubers should be destroyed or fed to pigs.

Crop Rotation.—Consecutive crops of sweet potatoes should not be grown on land known to be infested with this pest. Some other food crop, such as peas, beans, or maize, should be planted as a rotation crop.

Spraying.—Chittenden recommends spraying with 1 lb. of powdered zinc arsenite to 40 gallons of water, with the addition of 15 lbs. of cactus solution to ensure the mixture adhering to the foliage. Spraying should be done as soon as the weevils appear and repeated two or three times at intervals of a week.

Literature Consulted.

Chittenden, F. H.—Bul. 1020, U.S. Dept. Agric. (1919).
Conradi, A. F.—Bul. 93, Texas Agric. Exper. Sta. (1907).
Howard, L. O.—Report of the Entomologist, U.S. Dept. Agric. (1920).
Newell, W.—Quarterly Bul., V. No. 1 (1917).
Pierce, W. D.—Jn. Agric. Res., V. 12, No. 9 (1918).
Reinhard, H. J.—Bul. 308, Texas Agric. Exp. Sta. (1923).
Sanderson, E. D.—Insect Pests of Farm, Orchard and Garden (1912).

ENTOMOLOGICAL PUBLICATIONS.

Persons engaged in any form of rural industry will receive such of the entomological publications of this Department free, except (a), as may be of use to them in their branch of agriculture on request to the Government Entomologist, Hope Gardens, Kingston P. O.

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Circulars.

1. Directions for Killing, Preserving and Packing Insects.
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5. The Prevention and Control of Insect Pests.
6. Control Measures against the Citrus Black Fly.
7. Resuscitation of Decadent Citrus Groves.
8. The Banana Borer.
9. The Principal Insect Pests of Tobacco in Jamaica.
10. Citrus Cultivation.
11. The Sweet Potato Weevil.

Bulletins.

(a) 1. Coccidæ of Jamaica. (Technical.)
2. The Principal Agricultural Pests of Jamaica. (Price 2s. at the "Times" Store.)
3. White Flies (Aleurodidæ). (Technical).
4. Check List of the Insects of Jamaica. (Technical). In preparation.